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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/724,269 | 11/28/2000 | Simon Kasif | 0918.2033-000<br>(P00-3373) | 7893 |

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| EXAMINER | |
|---|---|
| SHEINBERG, MONIKA B | |
| ART UNIT | PAPER NUMBER |
| 1631 | 6 |

DATE MAILED: 10/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/724,269 | KASIF ET AL. | |
| | Examiner | Art Unit | |
| | Monika B Sheinberg | 1631 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- *Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.*
- *If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.*
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 November 2000* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

*Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).*

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Drawings Notice*

Applicant is hereby notified that the required timing for the correction of drawings has changed. See the last 6 lines on the sheet which is attached to the back of the PTO-948, entitled "Attachment for PTO-948 (Rev. 03/01 or earlier)". Due to the above notification Applicant is required to submit drawing corrections within the time period set for responding to this Office action. Failure to respond to this requirement may result in abandonment of the instant application or a notice of a failure to fully respond to this Office action.

### *Sequence Non-Compliance*

This application contains sequence disclosures that are encompassed by the definitions for nucleotide and/or amino acid sequences set forth in 37 CFR § 1.821(a)(1) and (a)(2). However, this application fails to comply with the requirements of 37 CFR § 1.821 through 1.825 because Figure 3 contains an amino acid sequence. A Sequence Listing and a computer readable format of it must be provided with a statement that the two are identical. The sequence presented in the figure must still be included in the Sequence Listing; and a sequence identifier (SEQ ID NO: X) must be used, either in the drawing or in the Brief Description of the Drawings. Applicant is reminded that CD-ROM sequence listings are now accepted instead of a paper copy of the sequence listing for the specification. Applicant(s) are given the same response time regarding this failure to comply as that set forth to respond to this office action. A complete response to this office action includes compliance with this sequence rule compliance. Failure to comply may result in abandonment of this application.

### *Specification*

The disclosure is objected to because of the following informalities:

The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code on page 8, lines 22-23 and 28-29. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

Appropriate correction is required.

***Information Disclosure Statement***

The references Jaakkola et al (AU) and Burges, CJC (AX) of the information disclosure statement filed 3 December 2001; have been added to the PTO-892 to make them of record. Applicant is not required to submit another copy of the instant 1449.

***Claim Rejections - 35 USC § 101***

The pending claims have been reviewed in light of the Utility Examination Guidelines and Guidelines for Examination of Patent Applications under 35 U.S.C. 112, first paragraph, "Written Description" Requirement, Federal Register, Vol. 66, No. 4, pages 1092-1111, Friday, January 5, 2001.

The examiner is using the following definitions in evaluating the claims for utility.

"Specific" - A utility that is *specific* to the subject matter claimed. This contrasts with a *general* utility that would be applicable to the broad class of the invention.

"Substantial" - A utility that defines a "real world" use. Utilities that require or constitute carrying out further research to identify or reasonably confirm a "real world" context of use are not substantial utilities.

"Credible" - Credibility is assessed from the perspective of one of ordinary skill in the art in view of the disclosure and any other evidence of record that is probative of the applicant's assertions. That is, the assertion is an inherently unbelievable undertaking or involves implausible scientific principles.

"Well-established" - a specific, substantial, and credible utility which is well known, immediately apparent, or implied by the specification's disclosure of the properties of a material, alone or taken with the knowledge of one skilled in the art.

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title.

Claims 1-9 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The fixed length vector representation of a subject genome

sequence as claimed is a representational event of manipulated data that is determined by a mental process that solves a mathematical algorithm. See MPEP 2106:

> Claims to processes that do nothing more than solve mathematical problems or manipulate abstract ideas or concepts are more complex to analyze and are addressed below.
>
> If the "acts" of a claimed process manipulate only numbers, abstract concepts or ideas, or signals representing any of the foregoing, the acts are not being applied to appropriate subject matter. Schrader, 22 F.3d at 294-95, 30 USPQ2d at 1458-59. Thus, a process consisting solely of mathematical operations, i.e., converting one set of numbers into another set of numbers, does not manipulate appropriate subject matter and thus cannot constitute a statutory process.

Claims 1-18 are rejected under 35 U.S.C. 101 because the claimed invention lacks patentable utility. The instant application lacks specific and substantial utility of the fixed length vector representation of a subject genome sequence as claimed. The fixed length vector representation does not accomplish a specific and substantial means of representing the genome sequence. The new representation may intend to lead to various types of results useful to be indicative of a result, however no relationship can be derived from the data collected for forming the vector concerning possible gene locations within the genome, or gene activity, or evolutionary lines for conserved genome regions. The mathematical manipulation of data determined from biological fragment or sequence presence leads to specific and substantial utility. As such, the fixed length vector representation lacks patentable utility.

The claimed fixed length representation is not supported by a specific asserted utility because the disclosed uses of the representations are not specific and are generally applicable to any biological fragments, i.e. nucleic acids. The specification (p. 3) states that the generated representation may be useful for sequence analysis through classifying, indexing, or clustering the new representations to determine relationships in similar sequences of genes or proteins. To what purpose the clustering or classification occurs is not disclosed. If representations were to be classified or clustered by similar representations, no meaning could be readily available for determinative information concerning that event. In fact, the specification never connects any of the specific clustering, classifying or indexing events to any specific utility. This desire for a utility for the claimed representation falls short of a readily available utility.

Further, the claimed fixed length representation is not supported by a substantial utility because no substantial utility has been established for the claimed subject matter. For example, a

new representation may be utilized to obtain a cluster of similar genome sequences based upon their representational similarities. The cluster set could then be used in conducting research to determine what how other than by the new representation, are the actual genomes similar so as to reflect the representational finding. The need for such research clearly indicates that the function of similar fixed length representations of a genome are not disclosed as to a currently available or substantial utility. A starting material that can only be used to produce a final product does not have substantial asserted utility in those instances where the final product is not supported by a specific and substantial utility. In this case for example, the cluster to be produced as a final product from resulting from the claimed new representation have asserted or identified specific and substantial utilities.

Claims 1-18 are also rejected under 35 U.S.C. § 112, first paragraph. Specifically, since the claimed invention is not supported by a specific, substantial, and credible utility, or, alternatively, a well established utility for the reasons set forth above, one skilled in the art would not know how to use the claimed invention.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-18 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Factors to be considered in determining whether a disclosure would require undue experimentation have been summarized in Ex parte Forman, 230 USPQ 546 (BPA 1986) and reiterated by the Court of Appeals in In re Wands, 8 USPQ2d 1400 at 1404 (CAFC 1988). The factors to be considered in determining whether undue experimentation is required include: (1) the quantity of experimentation necessary, (2) the amount or direction presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6)

the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims. The Board also stated that although the level of skill in molecular biology is high, the results of experiments in genetic engineering are unpredictable. While all of these factors are considered, a sufficient amount for a *prima facie* case are discussed below.

The instant application fails to provide guidance to one of ordinary skill in the art for generating a fixed length vector from a predetermined set of biological fragments or sequences as recited in claims 1 and 10. The specification does not provide or suggest how the set is to be predetermined and upon what basis are the known fragments selected for inclusion in the set; thus not enabling one of ordinary skill in the art to know what the predefined or predetermined set is to be representative of, or consisting of, to be of practical use. For example the selection of two random fragments do not seem to be a likely meaningful representation of a subject genome sequence; a different genome sequence would have a high probability of being deemed similar if two known fragments were picked at random to represent a genome. The specification does not disclose how to generate the required a set of known biological sequences that would lead to the construction of a meaningful vector representation. Page 8 of the specification states the sequences can be selected from any published sequence, motif, or protein database, however does not indicate the selection process for providing the instant method with a prepared set of known fragments to create meaningful vectors that would occur in the protein of interest as stated on page 9 (line 2) of the specification. If the generation of a vector element is not enabled then the generation of a fixed length representation that bases its construction on the vector elements, is also not enabled. While working examples are not, per se, required, the specification must provide adequate guidance such that one of skill in the art could practice the invention without undue experimentation. Given the lack of descriptive working examples in the specification, and the unpredictability of generating meaningful set of a predetermined or predefined set of biological sequences, the specification, as filed is not enabling for the providing a set of known biological fragments or sequences of a predetermined or predefined number for the method as claimed.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is vague and indefinite due to the lack of clarity of the term "biological fragment". It is unclear what are the metes and bounds of the parameters that define a biological fragment; for example, one base can be interpreted as a fragment. Claims 2-9 are also indefinite due to dependency from claim 1.

Claim 3 is vague and indefinite due to the lack of clarity in the generation of other vector formations of the same length as in claim 1. It is unclear if the same set of biological fragments is utilized for the vector construction as in claim 1. The same is true for other vector formations of claim 12 in relation to the set of biological sequences of claim 10. Claims 4, 5, 13 and 14 are also indefinite due to dependency from claims 3 and 12

Claim 1 and 10 vague and indefinite due to the lack of clarity in the predetermined number that provides the fixed length of the representation. It is unclear as to what are the metes and bounds of the parameters that define the predetermined number; minimum of two biological fragments or sequences, maximum of ten biological fragments, and so forth. This leads to a lack of clarity in how much of the subject genome sequence is encompassed by biological fragments or sequences; vast parts the genome sequence being represented would be left uncharacterized if only two short fragments made up the set of predetermined number of biological fragments or sequences. Claims 2-9 and 11-18 are also indefinite due to dependency from claims 1 and 10.

Claim 1 and 10 recites the limitation "fixed length representation" in lines 14 and 9, respectively. There is insufficient antecedent basis for this limitation in the claim. The claims recite the formed vector of "having a length equal to the predetermined number of the of known biological fragments in the provided set" (claim 1, lines 12-13) however the concept of a relationship between the fixed length representation and the predetermined number are unclear in the claim language where as figure 3 of the specification displays the vector is formed as a fixed

length representation of length N, just as the predetermined number is N. Claims 2-9 and 11-18 are also indefinite due to dependency from claims 1 and 10.

Claim 6 and 15 is unclear due to the contradiction of that which defines a genome sequence. For example, claim 6 recites the subject genome sequence is a protein sequence, however a genome is inherently considered to concern nucleic acids, not amino acids. Thus this claim is contradictory.

Claim 10 is vague and indefinite due to the lack of clarity in the methodology of the last step or outputting the formed vector. It is unclear by what means the output is represented; for example if the output is a data structure, representational of the formed vector, on a display screen. Claims 11-18 are also indefinite due to dependency from claim 10.

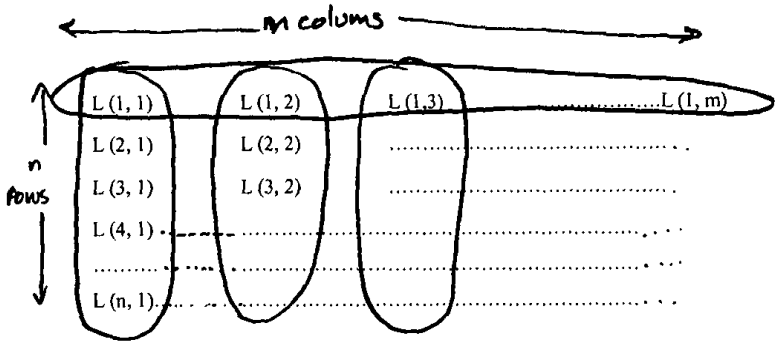
***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 6-8, 10-13 and 15-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Levy et al (*Bioinformatics*, 1998).

Levy et al teaches a system and method for the generation of a "sequence landscape" (abstract) that is a visual representation of "[w]ord frequencies of a query sequence in a database [that] can be represented by user-defined [...] cells" (p. 75, 1st column, 1st paragraph) as recited in claims 1 and 10. The user-defined cells, L(j, k), "indicate the where a word begins, j, and its length, k, and the value of a cell is the frequency of that word" (p. 75, 1st column, 2nd paragraph); thus the word cells are indicative of a known sequences and the value of the user-defined cells are indicative of count, score, or probability (claim 8, 17 and 18) of the found biological fragment or sequence. (See probabilities computed as described on page 76, 1st column, 2nd paragraph). Thus the cells can be interpreted as the formed vector elements of claims 1 and 10. Depending upon the number of cells defined by a user, the landscape representation anticipates the fixed length representation as claimed.




Each one of the columns or rows is a predetermined length of m or n, thus a fixed length. The textual context in which the analysis is performed allows the method's application to "both DNA and protein sequences" (p. 74, 2nd column, last paragraph), as recited in claims 6, 7, 15 and 16. Words, as demonstrated by the reference, can be known tandem repeating DNA sequences, promoter words (p. 79, 1st column) or protein functional domains (p. 74, 2nd column, 2nd paragraph) thus encompassing claims 2 and 11. The sequence landscape is produced for more than one query or subject sequence for comparison or classification means, thus anticipating claims 3, 4, 12 and 13. Thus the system and method demonstrated by Levy et al anticipates the method and apparatus (due to system hardware) of the instant claims.

### *Conclusion*

No claim is allowed.

### *Inquiries*

Papers related to this application may be submitted to Technical Center 1600 by facsimile transmission. Papers should be faxed to Technical Center 1600 via the PTO Fax Center located in Crystal Mall 1. The faxing of such papers must conform with the notices published in the Official Gazette, 1096 OG 30 (November 15, 1988), 1156 OG 61 (November 16, 1993), and 1157 OG 94 (December 28, 1993) (See 37 CFR § 1.6(d)). The CM1 Fax Center number is (703) 308-4242.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monika B. Sheinberg, whose telephone number is (703) 306-0511. The examiner can normally be reached on Monday-Friday from 9 A.M. to 5 P.M. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael P. Woodward, can be reached on (703) 308-4028.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to Patent Analyst, Tina Plunkett, whose telephone number is (703) 305-3524, or to the Technical Center receptionist whose telephone number is (703) 308-0196.

September 30, 2002

Monika B. Sheinberg
Art Unit 1631

MBS

ARDIN H. MARSCHEL
PRIMARY EXAMINER